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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/536,347	03/27/2000	Andrew D. Bailey III	LAM1P126/P0562	3591

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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT PAPER NUMBER

1763

DATE MAILED: 09/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/536,347

Applicant(s)

BAILEY, ANDREW D.

Examiner

Luz L. Alejandro

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 2,5-7,9-15,27,28 and 30-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,5-7,9-15,27,28 and 30-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 5-7, 12, 27-28, 30-31, and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205.

Hershkowitz et al. shows the invention substantially as claimed including a plasma processing apparatus for processing a substrate comprising: a process chamber 90 comprising: a wall defining part of the process chamber; a gas source for providing a gas within the process chamber defined by the wall; a device for igniting and sustaining within the process chamber a plasma from the gas provided by the gas source for said processing; and a plasma confinement arrangement, comprising a magnetic array 14 having a plurality of permanent magnetic elements that are disposed within said process chamber, said plurality of magnetic elements being configured to produce a magnetic field, and wherein said plurality of magnetic elements are within said plasma region, wherein the wall surrounds the magnetic elements and the plasma region so that plasma is able to form plasma deposition on the wall, and wherein the magnetic field produced by the magnetic elements reduces plasma deposition on the wall, wherein the magnetic elements are spaced from the wall, so that the gas provided

Art Unit: 1763

by the gas source is able to surround the magnetic elements and go into spaces between the wall and the magnetic elements (see fig. 5 and its description).

Hershkowitz et al. fails to expressly disclose in the embodiment of fig. 5 wherein each of said plurality of magnetic elements extend substantially from a first end of said process chamber to a chuck. However, Hershkowitz et al. in the embodiment of fig. 3, discloses an apparatus which comprises a plurality of permanent magnets extending from a first end of said process chamber to a chuck for generating a magnetic field within the processing chamber (see, for example, fig. 3 and its description). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of the embodiment of fig. 5 of Hershkowitz et al. so as to dispose the plurality of magnetic elements extending substantially from a first end of the process chamber to a chuck because this is an alternative way to generate the magnetic field and enhance the plasma in the processing chamber.

With respect to claims 5-6, note that the permanent magnets of the modified apparatus of Hershkowitz et al. have physical axis which extends along the plasma region and have magnetic axis which are substantially perpendicular to the physical axis.

Regarding claims 30 and 33, note that the chamber of the apparatus of Hershkowitz et al. is cylindrical (see, for example, col. 7-lines 62-65) and since the magnets of Hershkowitz et al. have the claimed magnetic structure, an azimuthally symmetric radial gradient will be produced by the magnetic field.

Concerning claim 34, note that the magnetic elements on end portions of the chamber of fig. 3 have a first end and a second end, wherein the first ends of the magnetic elements form an opening that is a magnet free opening, so that magnets do not extend across first ends of the magnets, and wherein the second ends of the magnetic elements form an opening that is a magnet free opening, so that magnets do not extend across second ends of the magnetic elements.

Claims 9 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 5-7, 12, 27-28, 30-31, and 33-34 above, and further in view of Collins et al., EP 0 892 422 or Taira et al., U.S. Patent 6,153,977.

Hershkowitz et al. is applied as above but fails to expressly disclose wherein said magnetic elements are individually contained in sleeves. Collins et al. discloses a single permanent magnet 80 contained within a sleeve 2010 that shields the magnet from plasma (see fig. 27 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the modified apparatus of Hershkowitz et al. so as to individually contain single permanent magnets in sleeves because in such a way this would prevent damage to the permanent magnets.

Alternatively, Taira et al. discloses a permanent magnet 5 contained within a sleeve 2 that shields the magnet from plasma (see fig. 4 and col. 3-line 53 to col. 5-line 16). In view of this disclosure, it would have been obvious to one of ordinary skill in the

Art Unit: 1763

art at the time the invention was made to modify the modified apparatus of Hershkowitz et al. so as to individually contain the permanent magnets in sleeves because in such a way this would prevent any contamination from sputtering of the permanent magnets.

With respect to having a single permanent magnet in each sleeve, it would have been obvious to one skilled in the art at the time the invention was made to use such a sleeve because there is not evidence that the choice of the sleeve would significantly affect the overall performance of the plasma processing apparatus.

Claims 10-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 5-7, 12, 27-28, 30-31, and 33-34 above, and further in view of Grunenfelder, U.S. Patent 5,399,253 or Barankova et al., WO 99/27758.

Hershkowitz et al. does not expressly disclose that the permanent magnets are moved to shift the magnetic field over time. Grunenfelder discloses an apparatus comprising permanent magnets 13,14 that are moved so that the magnetic field shifts over time (see abstract, figs. 3a-4c and col. 6-line 18 to col. 7-line 31). Barankova et al. discloses an apparatus comprising permanent magnets 1,2 that are moved so that the magnetic field shifts over time (see abstract, and figs. 1-9). Therefore, in view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the modified apparatus of Hershkowitz et al. as to move the permanent magnets in order to provide a rotatable magnetic field in the chamber.

Claims 32 and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz et al., U.S. Patent 5,032,205 as applied to claims 2, 5-7, 12, 27-28, 30-31, and 33-34 above, and further in view of Collins et al., U.S. Patent 6,077,384.

Hershkowitz et al. is applied as above but does not expressly disclose further comprising a coil adjacent to the first ends of the plurality of the magnetic elements or the process chamber and a dielectric window at the top of the substantially cylindrical shape. Collins et al. discloses an apparatus which has both inductive and capacitive coupling because of a coil 145 and a parallel plate electrode structure (110,120) with a dielectric window 110 at the top of the chamber (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Hershkowitz et al. so as to include the coil of Collins et al. because such an apparatus will allow for more efficient plasma processing. Furthermore, note that the apparatus of Hershkowitz et al. modified by Collins et al. will also have the claimed coil/magnet/process chamber structure.

### ***Response to Arguments***

Applicant's arguments filed 07/27/05 with respect to the Hershkowitz et al. reference have been fully considered but they are not persuasive. Applicant argues that Hershkowitz et al. does not necessarily show an azimuthally symmetric radial gradient. However, the specification of the instant application states that an azimuthally symmetric radial gradient occurs because of the multicusp magnetic patterns and the

Art Unit: 1763

minimum magnetic field at the substrate. Note that the apparatus of Hershkowitz et al. also has similar characteristics and therefore an azimuthally symmetric radial gradient would be expected to be present.

Furthermore, applicant's arguments with respect to claims 9 and 13-14 are moot in view of the new grounds of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

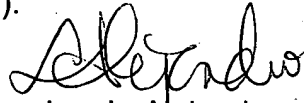
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-

Art Unit: 1763

1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Luz L. Alejandro  
Primary Examiner  
Art Unit 1763

September 12, 2005